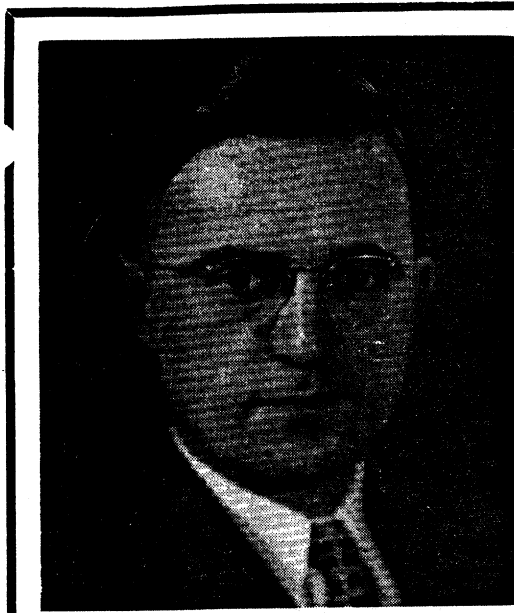


7/1



# New Food Products from Honey

by Jonathan W. White, Jr.

*Eastern Regional Research Laboratory<sup>1</sup>  
Philadelphia 18, Pennsylvania*

**R**ESearch directed toward improving the utilization of honey has been under way on a limited scale in the Bureau of Agricultural and Industrial Chemistry intermittently during the past fifty years. A great deal of analytical work was done during the time of Harvey W. Wiley around the turn of the century; later, during the period 1928-1943, a considerable amount of fundamental and technological work was carried out. The work with which the writer is associated has been under way for about four years. It is located at the Eastern Regional Research Laboratory of the Bureau at Philadelphia. This is one of four such laboratories, devoted to increasing the use of farm products, by-products and wastes by chemical and engineering research and development. The program of each laboratory includes the principal agricultural products grown in the area of the country in which the laboratory is located. These laboratories have been in active existence for over ten years; the reader who is interested in the achievements of the laboratories is referred to the article "A Decade of Chemical Achievement" in Chemical and Engineering News of December 24, 1951.

The transition from the wartime sellers' market in honey had been rather abrupt and the industry found inventories high, especially in the lower-grade, darker, stronger flavored honeys and a considerable carry-over from year to year.

The Department was requested to investigate methods of eliminating this surplus of strong-flavored honey and the first project undertaken by us was the study of methods of

modifying or completely removing the flavor of such honey. This work was under the direction of Mr. G. P. Walton until his retirement in December of 1949.

After a considerable period of experimentation, involving hundreds of small-scale processing tests, two methods of flavor modification were recommended in a bulletin issued in May 1950.<sup>2</sup> Because of difficulty in filtration of the types of honey which were to be processed by these methods, it was necessary to dilute the honey for treatment. The milder treatment, which reduced the flavor intensity of the honey somewhat but did not change its floral-type characteristics, was a treatment with a small amount of a colloidal clay, bentonite, which caused a flocculation of the honey colloids. Removal was by pressure filtration, followed by reconcentration to honey density. A more vigorous treatment was also worked out by which all honey flavor and much of the color was removed, leaving an essentially flavorless sirup which contained all the sugar values of the original honey. This process included dilution of the honey, neutralization of part of the acidity with lime, and heat treatment with activated carbon, followed by filtration and reconstitution to honey density. It was estimated the process could be carried out for about 1.5 cents per pound, including all expenses, interest, amortization of plant, etc., except administration and sales expense.

The product of this treatment is an essentially flavorless sirup which would have to compete with corn, cane and invert sirups for market. The levulose content of the sirup

is the same as that of the honey from which it is made, which offers a small advantage. Such a product should be in considerable demand during times of sugar shortage.

In an effort to find a use for de-flavored honey sirup in which no other sugar product could be substituted, we investigated the possibility of producing a fruit-flavored spread<sup>3</sup> which depended for its texture on the fine-grained crystallization familiar to honey people in "creamed" or "Dyce-processed" honey. It was found possible to make such a product using a variety of fruit juices and purees, combined with de-flavored honey evaporated to honey density, seeded and crystallized as in the honey-spread processes. Manufacture by this procedure required the use of a vacuum pan, not a common piece of equipment in honey processing although some plants are so equipped.

On further consideration, we made a number of samples of fruit spread using normal, good-flavored honey rather than de-flavored honey. By reducing the amount of fruit it was found possible to obtain a product with a pleasing combination of fruit and honey flavor. Some of the fruit flavors tried were raspberry, strawberry, grape, apricot, pineapple, peach, loganberry, and orange. If the juices of these fruits are used as the fruit component of the spread, they cause considerable dilution of the honey with water so that evaporation is required to return the mixture to a suitable water content to allow the crystallization to take place. There is no reason that this evaporation could not be done before mixing with honey. In fact, by using suitable fruit juice concentrates the

manufacture of the crystallized honey-fruit spread could be carried out with a minimum of equipment. It is then possible to mix the concentrate with honey in a suitable proportion, heat to pasteurize, cool, seed and crystallize. We have been granted a patent on the process and product assigned to the United States of America, and available for use on a royalty-free, non-exclusive license.<sup>4</sup> A Western honey packer is planning to produce this spread on a trial basis.

As an example of cooperative effort within the Department, we have been working with the Dairy Research Laboratories of the Bureau of Dairy Industry. In this project, which has been largely carried out at the BDI laboratories in Washington, methods have been developed for manufacture of three concentrated honey-milk products.<sup>5</sup> It has long been thought that one of the deterrents to the wider use of honey in manufacturing has been the general difficulty of handling the material due to its physical nature. A dry honey should have wide applicability in the food field. A step in this direction is the production of a dry honey-skim milk product, composed of 40% honey solids and 60% non-fat milk solids. This material, a white, free flowing fine powder with a pleasant honey-milk flavor can be manufactured by methods developed in this cooperative study.

Two other honey-milk products have been developed, a honey-sweetened condensed milk and an evaporated milk fortified with honey. These products are easily manufactured and show adequate storage stability. It is possible that products of this nature might find application in infant feeding, provided research on this application would be so indicative.

Since the honey research program of the Bureau is operating with limited budget and personnel, we have tried to extend our program by cooperative efforts with other organizations and by contracting with outside organizations for research and development. Under the Research and Marketing Act of 1946, authority was granted to contract for certain research with organizations outside the Department provided the public interest was best served thereby. An example of the research contract mentioned above is the contract project carried out under the supervision of this Labo-

ratory at the Kansas Agricultural Experiment Station, at Manhattan, Kansas. The first contract has been completed and the results are either in print<sup>6</sup> or in process of publication.<sup>7</sup> This work was supported in part by funds from the American Beekeeping Federation. Designed to find the effects, if any, of the natural variability of honey in commercial baked goods and production schedules, the results show that by observing certain simple rules, certain difficulties may be avoided which have been encountered in the past by bakers using honey. An in-

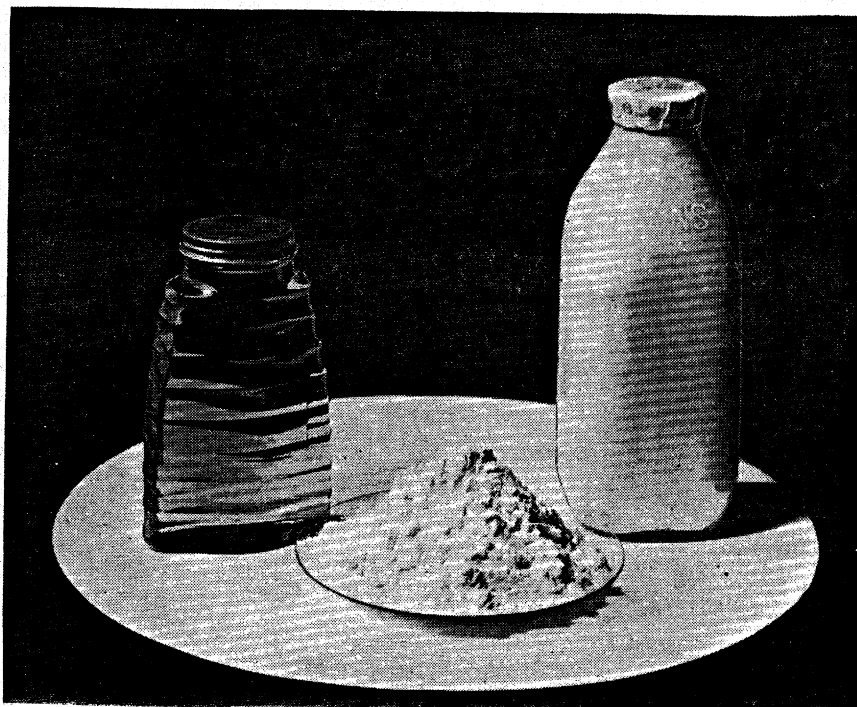
vestigation of the value of honey in commercial cake and sweet goods has resulted in findings of great potential interest to the honey industry, which will soon be published.<sup>7</sup> A second contract on the role of honey in the cookie and biscuit field and in certain military items is under way at present.

The question of delaying granulation in chunk-honey pack so that such an item could be more than a seasonal specialty in the North is being studied. A process has been developed which shows promise in increasing the shelf-life of labora-



Above: Crystallized honey-fruit spread is a delicious combination of fruit and honey flavor.

Below: Combining the nutritional values of honey and nonfat milk, dry honey-skim milk offers a convenient way to use these products in food manufacture.



tory packs around 35 per cent at 57° Fahrenheit, the best temperature for rapid granulation. Treated samples stored at the temperature of the laboratory for a year have not yet become unsalable. Additional work may be needed to make the process useful to the producer, however.

While the development of new honey products is important in extending the use of honey, it would not be a cure-all for the marketing difficulties of the industry. The necessity would still exist for con-

certed action directed to the solution of marketing problems with the familiar honey items. Perhaps one of the most important problems facing the honey industry is that of producing it in a form that would facilitate its use by large commercial users, such as the baking industry. Dried honey-skim milk is a step in this direction, but its usefulness is limited to formulations requiring considerable amounts of milk solids.

1. One of the laboratories of the Bureau of Agricultural and Industrial Chemis-

- try, Agricultural Research Administration, U. S. Department of Agriculture.
2. J. W. White, Jr., and G. P. Walton, "Flavor Modification of Low-Grade Honey," AIC-272, Eastern Regional Research Laboratory, B.A.I.C., U. S. Dept. of Agriculture, May 1950.
3. J. W. White, Jr., "New Crystallized Fruit Spread Shows Commercial Promise," Food Industries **22**, 1216 (1950).
4. U. S. Patent 2,573,750, "Crystallized Fruit Spread and Process for Making Same," J. W. White, Jr. Nov. 6, 1951.
5. G. P. Walton, J. W. White, Jr., B. H. Webb, C. F. Hufnagel and A. H. Stevens, "Manufacture of Concentrated Milk and Honey Products," Food Technology **5**, 203 (1951).
6. L. B. Smith and J. A. Johnson, "Honey—Its Use in Bread Production," Northwest Miller **246** (14), 34 (1951).
7. L. B. Smith and J. A. Johnson, "The Use of Honey in Cake and Sweet Dough." Submitted for publication in the **Bakers' Technical Digest**.